QB
4
U33

UNITED STATES NAVAL OBSERVATORY

CIRCULAR NO. 101

U. S. Naval Observatory, Washington, D. C. 20390 July 29, 1964

SOLAR ECLIPSES, 1971 – 1975

by

Julena S. Duncombe

At the request of Commission 12a of the International Astronomical Union, the American Nautical Almanac Office agreed to publish advance information on solar eclipses, computed from tabular positions of the Sun and Moon prepared for the purpose in the British Nautical Almanac Office.

This *Circular* gives the results of the definitive calculations for all solar eclipses in 1971, 1972, 1973, 1974, 1975.

The arguments are given in Ephemeris Time (E. T.), and the longitudes are referred to the " Ephemeris Meridian ", (see *Explanatory Supplement to the Astronomical Ephemeris and the American Ephemeris and Nautical Almanac*).

Once the value of Δ T is known, the accurate position of the track may be obtained in the following manner.

Change all time – arguments into Universal Time by setting.

$$\text{E. T.} = \text{U. T.} + \Delta T$$

Leave latitudes unchanged, and refer the longitudes to the meridian of Greenwich by applying – 1.002738 Δ T as a correction to the tabulated longitudes.

East longitudes are negative.

U.S. NAVAL OBSERVATORY
OCT 15 1964
LIBRARY

PARTIAL ECLIPSE OF 1971 FEBRUARY 25

Geocentric conjunction will occur in right ascension $22^h31^m47^s.51$, at E.T. $25^d10^h37^m13^s.9$, the declination of the Sun being $-9^\circ14'52''.0$. The greatest eclipse will have a magnitude of 0.788 at longitude $+33^\circ40'$, latitude $+61^\circ35'$.

The eclipse will be observable in the eastern part of Greenland, Europe, the western part of Asia, and the northwestern part of Africa.

PARTIAL ECLIPSE OF 1971 JULY 22

Geocentric conjunction will occur in right ascension $8^h04^m08^s.78$, at E.T. $22^d08^h38^m38^s.2$, the declination of the Sun being $+20^\circ23'02''.6$. The greatest eclipse will have a magnitude of 0.069 at longitude $-177^\circ01'$, latitude $+63^\circ36'$.

The eclipse will be observable in the northwestern part of Alaska, and the northeastern part of Asia.

PARTIAL ECLIPSE OF 1971 AUGUST 20-21

Geocentric conjunction will occur in right ascension $9^h57^m58^s.89$, at E.T. $20^d23^h50^m24^s.6$, the declination of the Sun being $+12^\circ24'52''.3$. The greatest eclipse will have a magnitude of 0.508 at longitude $-135^\circ15'$, latitude $-61^\circ48'$.

The eclipse will be observable in the southeastern part of Australia, New Zealand, and parts of Antarctica.

ANNULAR ECLIPSE OF 1972 JANUARY 16

Central Line

Ephemeris Time	Latitude	Ephemeris Longitude	Duration	Width of Path	Altitude of Sun
h m	° ′	° ′	m s	*mi*	°
Limit	-68 36	+143 24	. .. .	...	..
10 30	78 09.3	147 18.5	1 53.9	235	9
35	81 59.7	+162 42.4	1 53.0	218	13
40	83 37.8	-170 28.6	1 52.3	207	16
45	83 09.6	142 19.0	1 51.8	200	17
50	81 22.6	124 23.6	1 51.3	196	19
55	79 04.6	114 46.6	1 51.0	194	20
11 00	-76 35.6	-109 36.4	1 50.7	194	20
05	74 02.3	106 49.6	1 50.5	196	20
10	71 26.5	105 27.8	1 50.4	200	20
15	68 47.9	105 02.8	1 50.4	205	19
20	66 05.0	105 21.6	1 50.5	212	18
25	63 15.2	106 20.3	1 50.7	222	16
11 30	-60 13.5	-108 04.0	1 51.1	233	14
35	56 48.6	110 54.1	1 51.7	247	11
40	52 14.5	116 33.8	1 52.8	262	6
Limit	-48 48	-123 05	. .. .	...	..

Geocentric conjunction will occur in right ascension $19^h49^m26^s.86$, at E.T. $16^d10^h33^m13^s.3$, the declination of the Sun being $-21^\circ03'49''.2$.

TOTAL ECLIPSE OF 1972 JULY 10

Central Line

Ephemeris Time	Latitude	Ephemeris Longitude	Duration	Width of Path	Altitude of Sun
h m	° ′	° ′	m s	*mi*	°
Limit	+51 02	−143 46	. .. .	...	..
18 30	54 13.6	150 40.8	1 25.1	91	5
35	60 17.5	165 32.3	1 41.8	98	16
40	63 25.5	−175 20.0	1 51.7	101	22
45	65 36.1	+175 53.7	1 59.5	103	26
50	67 10.4	167 29.3	2 06.1	105	30
55	68 16.6	159 14.8	2 11.7	105	33
19 00	+68 59.1	+151 09.3	2 16.7	106	35
05	69 20.6	143 16.4	2 20.9	107	38
10	69 23.7	135 41.7	2 24.6	108	40
15	69 10.5	128 31.1	2 27.7	109	41
20	68 43.0	121 48.7	2 30.2	109	43
25	68 03.3	115 36.8	2 32.3	109	44
19 30	+67 13.2	+109 55.8	2 33.8	110	45
35	66 14.2	104 44.5	2 34.9	110	46
40	65 07.8	100 00.8	2 35.5	111	46
45	63 54.9	95 41.9	2 35.6	111	46
50	62 36.5	91 44.9	2 35.3	112	46
55	61 13.2	88 06.5	2 34.5	112	46
20 00	+59 45.4	+ 84 44.1	2 33.2	113	46
05	58 13.4	81 34.8	2 31.5	113	45
10	56 37.5	78 35.9	2 29.3	113	44
15	54 57.5	75 44.9	2 26.7	113	42
20	53 13.3	72 59.4	2 23.6	113	41
25	51 24.5	70 16.7	2 20.0	113	39
20 30	+49 30.6	+ 67 33.9	2 15.9	113	37
35	47 30.7	64 47.9	2 11.3	113	35
40	45 23.2	61 54.2	2 06.0	112	32
45	43 06.1	58 47.0	2 00.1	110	28
50	40 35.2	55 16.4	1 53.2	108	25
55	37 42.5	51 03.2	1 45.0	105	20
21 00	+34 05.5	+ 45 14.4	1 34.2	98	13
Limit	+27 40	+ 32 22	. .. .	...	..

TOTAL ECLIPSE OF 1972 JULY 10 (*Continued*)

Geocentric conjunction will occur in right ascension $7^h20^m36^s.31$, at E.T. $10^d19^h29^m05^s.0$, the declination of the Sun being $+22^\circ09'05''.0$.

ANNULAR ECLIPSE OF 1973 JANUARY 4

Central Line

Ephemeris Time	Latitude	Ephemeris Longitude	Duration	Width of Path	Altitude of Sun
h m	° ′	° ′	m s	*mi*	°
Limit	−25 01	+128 18	. .. .	...	..
13 55	29 02.6	118 47.5	5 43.0	212	10
14 00	−32 37.1	+109 51.1	6 00.1	203	19
05	34 43.5	104 04.2	6 12.5	197	25
10	36 15.4	99 25.2	6 23.1	193	30
15	37 26.4	95 23.9	6 32.6	189	35
20	38 22.7	91 47.2	6 41.4	185	39
25	39 07.6	88 28.2	6 49.5	183	42
14 30	−39 43.2	+ 85 22.7	6 57.0	180	45
35	40 10.9	82 28.1	7 03.9	178	48
40	40 31.6	79 42.4	7 10.4	176	51
45	40 46.2	77 04.4	7 16.3	174	54
50	40 55.2	74 33.0	7 21.6	173	57
55	40 59.2	72 07.6	7 26.4	171	59
15 00	−40 58.4	+ 69 47.6	7 30.7	170	62
05	40 53.3	67 32.5	7 34.4	170	64
10	40 44.0	65 21.8	7 37.6	168	66
15	40 30.9	63 15.4	7 40.2	168	68
20	40 14.1	61 12.9	7 42.2	167	70
25	−39 53.8	+ 59 13.9	7 43.7	166	71

ANNULAR ECLIPSE OF 1973 JANUARY 4 (*Continued*)

h	m	°	′	°	′	m	s	*mi*	°
15	30	-39	30.1	+ 57	18.4	7	44.6	166	73
	35	39	03.3	55	26.0	7	45.0	166	74
	40	38	33.3	53	36.4	7	44.8	166	74
	45	38	00.4	51	49.5	7	44.1	166	75
	50	37	24.5	50	05.0	7	42.8	166	75
	55	36	45.7	48	22.7	7	41.1	167	74
16	00	-36	04.2	+ 46	42.2	7	38.9	167	73
	05	35	19.8	45	03.3	7	36.3	168	72
	10	34	32.7	43	25.7	7	33.2	169	71
	15	33	42.7	41	49.1	7	29.7	170	69
	20	32	49.9	40	13.1	7	25.9	171	67
	25	31	54.2	38	37.3	7	21.6	172	65
16	30	-30	55.6	+ 37	01.2	7	17.1	174	63
	35	29	53.8	35	24.4	7	12.2	175	60
	40	28	48.7	33	46.2	7	07.0	177	58
	45	27	40.1	32	06.0	7	01.6	179	56
	50	26	27.8	30	22.9	6	55.8	181	53
	55	25	11.2	28	36.0	6	49.8	183	50
17	00	-23	49.9	+ 26	43.8	6	43.5	185	47
	05	22	23.2	24	44.7	6	36.9	189	44
	10	20	50.0	22	36.5	6	30.0	191	40
	15	19	09.0	20	15.6	6	22.7	194	37
	20	17	17.8	17	36.9	6	14.9	197	33
	25	15	12.6	14	31.6	6	06.4	201	28
17	30	-12	45.7	+ 10	42.1	5	57.0	205	23
	35	9	36.2	+ 5	20.0	5	45.4	209	15
Limit		- 3	13	- 7	46	.	.. .	...	..

Geocentric conjunction will occur in right ascension $19^h01^m30^s.18$, at E.T. $4^d15^h39^m48^s.2$, the declination of the Sun being $-22^\circ41'26''.5$.

TOTAL ECLIPSE OF 1973 JUNE 30

Central Line

Ephemeris Time	Latitude	Ephemeris Longitude	Duration	Width of Path	Altitude of Sun
h m	° ′	° ′	m s	*mi*	°
Limit	+ 4 25	+ 60 02	• •• •	•••	••
10 00	10 18.9	46 14.1	3 53.5	136	16
05	12 59.7	39 35.7	4 18.4	140	24
10	14 47.1	34 49.3	4 38.4	143	30
15	16 07.9	30 54.9	4 55.8	146	35
20	17 11.4	27 31.9	5 11.5	148	40
25	18 02.3	24 30.4	5 26.0	150	44
10 30	+18 43.2	+ 21 44.6	5 39.3	151	48
35	19 15.9	19 10.8	5 51.7	153	51
40	19 41.6	16 46.7	6 03.1	155	55
45	20 01.1	14 30.4	6 13.5	155	58
50	20 15.1	12 20.6	6 23.0	157	61
55	20 24.0	10 16.4	6 31.5	158	64
11 00	+20 28.3	+ 8 16.8	6 39.0	159	67
05	20 28.2	6 21.2	6 45.6	159	70
10	20 24.0	4 29.2	6 51.2	160	73
15	20 16.0	2 40.1	6 55.8	160	76
20	20 04.2	+ 0 53.7	6 59.4	161	79
25	19 48.8	− 0 50.5	7 01.9	161	81
11 30	+19 30.0	− 2 32.9	7 03.4	161	83
35	19 07.7	4 13.6	7 03.8	161	85
40	18 42.0	5 53.1	7 03.3	161	85
45	18 13.0	7 31.7	7 01.8	161	84
50	17 40.7	9 09.7	6 59.4	161	82
55	17 05.0	10 47.4	6 55.9	160	80
12 00	+16 25.9	− 12 25.1	6 51.6	160	77
05	15 43.4	14 03.4	6 46.4	159	74
10	14 57.3	15 42.5	6 40.3	159	72
15	14 07.5	17 23.0	6 33.4	158	69
20	13 13.8	19 05.5	6 25.7	157	66
25	+12 16.0	− 20 50.5	6 17.2	156	63

TOTAL ECLIPSE OF 1973 JUNE 30 *(Continued)*

h m	° ′	° ′	m s	*mi*	°
12 30	+11 13.8	− 22 39.0	6 08.0	155	60
35	10 06.7	24 31.9	5 58.1	155	56
40	8 54.2	26 30.4	5 47.3	154	53
45	7 35.6	28 36.1	5 35.9	152	49
50	6 09.9	30 51.4	5 23.6	151	46
55	4 35.6	33 19.2	5 10.4	149	42
13 00	+ 2 50.6	− 36 04.5	4 56.2	147	37
05	+ 0 51.2	39 14.9	4 40.6	145	33
10	− 1 29.2	43 05.1	4 23.2	142	27
15	4 26.4	48 10.0	4 02.4	138	20
20	9 10.4	57 07.9	3 32.0	131	9
Limit	−12 49	− 65 00	. .. .	...	..

Geocentric conjunction will occur in right ascension $6^h37^m08^s.60$, at E.T. $30^d11^h40^m00^s.1$, the declination of the Sun being $+23^\circ10'06''.3$.

ANNULAR ECLIPSE OF 1973 DECEMBER 24

Central Line

Ephemeris Time	Latitude	Ephemeris Longitude	Duration	Width of Path	Altitude of Sun
h m	° ′	° ′	m s	*mi*	°
Limit	+16 20	+101 25	. .. .	...	..
13 15	14 11.2	96 35.1	7 32.8	229	5
20	9 52.5	86 56.4	8 10.3	222	17
25	7 43.9	82 03.1	8 34.7	219	23
13 30	+ 6 12.1	+ 78 25.7	8 55.6	216	28
35	5 00.5	75 27.8	9 14.6	216	32
40	4 02.6	72 55.2	9 32.3	214	36
45	3 14.8	70 40.1	9 49.0	213	39
50	2 35.0	68 38.1	0 04.8	213	42
55	2 01.8	66 46.3	0 19.7	213	45
14 00	+ 1 34.2	+ 65 02.5	0 33.7	213	48
05	1 11.6	63 25.3	0 46.8	213	50
10	0 53.4	61 53.5	0 58.9	213	53
15	0 39.3	60 26.2	1 10.1	213	55
20	0 28.8	59 02.8	1 20.2	213	57
25	+ 0 21.8	+ 57 42.5	1 29.2	213	58

ANNULAR ECLIPSE OF 1973 DECEMBER 24 (*Continued*)

h m	° ′	° ′	m s	*mi*	°
14 30	+ 0 18.0	+ 56 25.0	1 36.9	214	60
35	0 17.3	55 09.7	1 43.5	214	61
40	0 19.6	53 56.4	1 48.8	214	63
45	0 24.7	52 44.6	1 52.8	213	64
50	0 32.6	51 34.1	1 55.5	213	64
55	0 43.3	50 24.5	1 56.8	213	65
15 00	+ 0 56.6	+ 49 15.6	1 56.8	212	65
05	1 12.6	48 07.2	1 55.6	212	65
10	1 31.3	46 58.9	1 53.0	212	65
15	1 52.7	45 50.5	1 49.3	211	64
20	2 16.8	44 41.8	1 44.4	210	64
25	2 43.7	43 32.3	1 38.3	209	63
15 30	+ 3 13.5	+ 42 21.9	1 31.3	208	62
35	3 46.3	41 10.1	1 23.3	208	60
40	4 22.1	39 56.5	1 14.3	208	58
45	5 01.3	38 40.8	1 04.5	207	57
50	5 43.9	37 22.3	0 54.0	207	55
55	6 30.3	36 00.6	0 42.8	207	53
16 00	+ 7 20.8	+ 34 34.7	0 30.9	207	50
05	8 15.8	33 03.8	0 18.3	207	48
10	9 15.8	31 26.8	0 05.2	208	45
15	10 21.8	29 41.9	9 51.4	208	42
20	11 34.6	27 47.2	9 37.1	209	39
25	12 55.8	25 39.5	9 22.1	210	36
16 30	+14 27.6	+ 23 14.2	9 06.2	212	32
35	16 13.7	20 23.5	8 49.2	214	28
40	18 21.2	16 52.7	8 30.6	216	23
45	21 06.9	12 05.8	8 08.9	220	17
50	25 55.4	+ 2 58.3	7 36.8	228	7
Limit	+28 54	− 3 22	. .. .	...	..

Geocentric conjunction will occur in right ascension $18^h11^m39^s.66$, at E.T. $24^d15^h08^m44^s.1$, the declination of the Sun being $-23^\circ24'55''.8$.

TOTAL ECLIPSE OF 1974 JUNE 20

Central Line

Ephemeris Time	Latitude	Ephemeris Longitude	Duration	Width of Path	Altitude of Sun
h m	° ′	° ′	m s	*mi*	°
Limit	-45 25	- 59 04	. .. .	...	..
3 50	43 00.6	64 05.0	3 16.6	159	4
55	38 24.2	74 06.7	3 46.8	171	14
4 00	-36 17.2	- 79 14.6	4 04.7	180	19
05	34 52.4	83 06.1	4 18.7	187	22
10	33 51.3	86 18.5	4 30.3	193	25
15	33 06.4	89 06.6	4 40.1	200	28
20	32 33.8	91 38.6	4 48.4	205	30
25	32 11.3	93 59.1	4 55.1	209	31
4 30	-31 57.4	- 96 11.4	5 00.5	213	32
35	31 51.3	98 17.8	5 04.5	216	33
40	31 52.4	100 20.3	5 07.2	217	34
45	32 00.3	102 20.4	5 08.6	217	34
50	32 14.9	104 19.5	5 08.7	216	34
55	32 36.3	106 18.9	5 07.6	215	34
5 00	-33 04.6	-108 20.1	5 05.1	212	33
05	33 40.3	110 24.5	5 01.4	208	33
10	34 24.0	112 33.9	4 56.3	204	31
15	35 16.8	114 50.7	4 50.0	199	30
20	36 20.3	117 18.0	4 42.2	194	28
25	37 36.7	120 00.1	4 33.0	189	26
5 30	-39 10.1	-123 04.5	4 22.0	183	23
35	41 08.2	126 44.4	4 08.9	177	20
40	43 48.2	131 30.9	3 52.4	170	15
45	48 21.5	139 33.3	3 27.8	162	7
Limit	-53 10	-148 19	. .. .	...	..

Geocentric conjunction will occur in right ascension $5^h53^m27^s.56$, at E.T. $20^d04^h55^m25^s.2$, the declination of the Sun being $+23^\circ26'00''.6$.

PARTIAL ECLIPSE OF 1974 DECEMBER 13

Geocentric conjunction will occur in right ascension $17^h22^m01^s.35$, at E.T. $13^d16^h17^m18^s.1$, the declination of the Sun being $-23^\circ09'16''.0$. The greatest eclipse will have a magnitude of 0.827 at longitude $+69^\circ34'$, latitude $+66^\circ46'$.

The eclipse will be observable in North America except the northwestern part, the northern coast of South America, the southern part of Greenland, the southern part of Ireland, and Portugal.

PARTIAL ECLIPSE OF 1975 MAY 11

Geocentric conjunction will occur in right ascension $3^h10^m14^s.68$, at E.T. $11^d07^h38^m38^s.2$, the declination of the Sun being $+17^\circ44'39''.4$. The greatest eclipse will have a magnitude of 0.864 at longitude $+80^\circ33'$, latitude $+69^\circ47'$.

The eclipse will be observable in western Africa, Europe, Greenland, northern Asia, and the northwestern part of Alaska.

PARTIAL ECLIPSE OF 1975 NOVEMBER 3

Geocentric conjunction will occur in right ascension $14^h32^m22^s.42$, at E.T. $3^d13^h40^m04^s.2$, the declination of the Sun being $-14^\circ58'32''.9$. The greatest eclipse will have a magnitude of 0.959 at longitude $+162^\circ05'$, latitude $-70^\circ30'$.

The eclipse will be observable in southern South America, and most of Antarctica.

The eclipse will be total in the ionosphere at 200 km, and 300 km.